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Determinants of Emerging Market Bond Spread

Do Economic Fundamentals Matter?

Macroeconomic variables matter and so does liquidity. External shocks (international interest rates) appear not to matter.

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Summary findings

In the 1990s international bond issues from developing countries surged dramatically, becoming one of the fastest-growing devices for financing external development. Their terms have improved as institutional investors have become more interested in emerging market securities and better economic prospects in a number of developing countries. But little is known about what determines the pricing and thus the yield spreads of new emerging market bond issues.

Min investigates what determines bond spreads in emerging markets in the 1990s. He finds that strong macroeconomic fundamentals in a country — such as low domestic inflation rates, improved terms of trade, and increased foreign assets — are associated with lower yield spreads.

By contrast, higher yield spreads are associated with weak liquidity variables in a country, such as a high debt-to-GDP ratio, a low ratio of foreign reserves to GDP, a low (high) export (import) growth rate, and a high debt-service ratio.

At the same time, external shocks — as measured by the international interest rate — matter little in the determination of bond spreads.

In the aggregate, Latin American countries have a negative yield curve.

This paper — a product of the Development Research Group — is part of a larger effort in the group to study international transmission of financial crises in emerging economies. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Eany Oh, room MC3-456, telephone 202-473-3410, fax 202-522-1155, Internet address poh@worldbank.org. March 1998. (31 pages)

DETERMINANTS OF EMERGING MARKET BOND SPREAD: DO ECONOMIC FUNDAMENTALS MATTER?+

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1. Introduction

This paper analyzes empirically the economic determinants of the yield spread on fixed-income securities of the emerging economies during the 1990s. In recent years, many countries have taken decisive steps to promote the development of their bond markets and, as a result, corporations are floating growing amounts of fixed-income securities in international and domestic markets while steadily reducing their dependence on bank financing. This change in the corporate financing pattern is caused by the necessity of substantial investments in infrastructure and capital-intensive projects that require long-term and fixed-rate debt capital (The World Bank, 1995).

However, little is known about the determinants that affect the pricing and thus yield spreads of new emerging market bond issues. The issue of how spreads are determined for emerging market bonds merits a closer investigation in view of the ongoing turbulance in emerging markets and the changing developing country prospects. Some of the important previous literature in this area are Edwards (1986), Haque, Kumar, Mark and Mathieson (1996) and Sachs (1985).

Sachs (1985) investigated the role of various macroeconomic policies and fundamentals for the debt-crisis and provided the empirical rationale for using certain economic fundamentals in the determination of the risk-premium in international capital markets. In particular, he emphasized the importance of trade and exchange rate policy for a developing country's performance.

Edwards (1986), in his study of bond pricing, compared the pricing of bonds and bank loans to test whether two markets are significantly different and found that the bond data confirm some of the most important implications of foreign borrowing models. Using data of yields on LDC bonds traded in the secondary market, he found a positive effect of higher debt ratios on the risk premium.

Recently, Haque et al (1996) investigated the economic determinants of developing country creditworthiness for some 60 developing countries and found that economic fundamentals - the ratio of nongold foreign exchange reserves to imports, the ratio of the current account to GDP, growth, and inflation - explain a large amount of variation in credit ratings and all developing country ratings were adversely affected by increases in international interest rates, independent of domestic economic fundamentals.

The purpose of this paper is to analyze the economic determinants of yield spreads on the US dollar denominated, fixed-income securities of emerging markets issued during the period from 1991-1995. In section II, we provide a model for the yield spread determination and a list of economic fundamentals assumed to affect the yield spread of the fixed-income securities. In section III, we estimate the model and analyze the volatility of the yield spread. In section IV, we present the concludion of the paper.

II. Determinants of the Yield Spread: The Model

The probability of default is a function of the unsustainability of a given level of external debt, arising either as a result of short-term illiquidity or long-run insolvency that is reflected in liquidity problems [Hanson(1974), Eaton and Gersovitz(1981),

Sachs(1982,84), Sachs and Cohen(1982)]. Assuming a risk-neutral lender and following the conventional model of risk-premium (Edwards, 1986), one obtains the following linear model for the spread determination:

$$\text{Log } s = \alpha + \sum \beta_i x_i + \varepsilon_i \qquad (1)$$

$$\alpha = \text{Log } (1 + i^*) \qquad (2)$$

where s is the yield spread on fixed income securities, i* is the risk-free world interest rate, x_is are the economic determinants of the probability of default, β_is are the corresponding coefficients and ε_i is a stochastic error term. A number of variables have been suggested by theoretical studies that can be included as x_is. These include economic variables that measure the domestic and external economic performance of a country and exogenous shocks that affect liquidity and solvency of developing countries (Edwards, 1986: Sachs, 1985: Haque et al, 1996). To be comprehensive, we selected 18 independent variables and classified them into the following four groups: (i) liquidity and solvency variables, (ii) macroeconomic fundamentals, (iii) external shocks and (iv) dummy variables.

1. Liquidity and Solvency Variables

The first group of variables relates to a country's liquidity or solvency problems. In any given period, lower export earnings (higher import expenditures) can increase the likelihood of short-term liquidity problems and hence debt-service difficulties, whereas a decline in the growth rate of output can contribute to a long-term insolvency problem and thereby lower creditworthiness ratings. In most theoretical models of foreign borrowing,

the debt-output ratio plays a crucial role, with its coefficient expected to have a positive sign (Hanson, 1974: Harberger, 1980: Sachs, 1984: Edwards, 1983) [1]. The lower the ratio of international reserves to GDP, the greater will be the threat of a sudden liquidity crisis, and the lower a country's risk rating. In this case, the coefficient is supposed to have a negative sign (Edwards, 1983). However, Gersovitz (1985) claimed that it will have a positive sign. Conversely, if the current account balance-to-GDP ratio is positive and higher, the yield spread will be lower (Sachs, 1981). In a given year, the current account deficit equals the increase in a country's net liabilities to foreigners, subject to an adjustment for capital gains and losses on pre-existing stocks of assets and liabilities. The cumulative deficit for years (net foreign assets) should then approximately equal the increase in the country's net liabilities over the course of the decade (Sachs, 1985). Thus, the increase in cumulative current account deficit implies an increase in the yield spread[2].

Debt service to export (debt-service ratio) measures possible liquidity (as opposed to solvency) problems faced by a particular country. It is expected that higher debt service ratios lower the degree of creditworthiness, resulting in a higher yield spread.

2. Macroeconomic Fundamentals

The second group of variables include macroeconomic fundamentals, which impact to the long-term insolvency problem of a country. An important influence on the downward/upward movements of yields in recent years has been broadly based on the importance of the macroeconomic policy discipline. The inflation rate can be regarded as a proxy for the quality of economic management; as a result, the higher the inflation rate,

the lower the yield spread. The influence of international developments on a country's creditworthiness is examined through two variables that capture the effects of external shocks to a county's trade and financial flows. Shocks to a country's trade flows are represented by changes in a country's terms of trade.

The real exchange rate can be included to measure the trade competitiveness of an economy. Sachs (1985) demonstrated the importance of the exchange rate management and trade regime, Cline(1983) claimed that inappropriate exchange rate policies in a number of LDC's were among the most important causes of the debt crises. Sustained real appreciation of these countries' currencies played a major role in the process of overborrowing. A less competitive real rate (appreciation) is expected to affect adversely the yield spread. Especially in the case of Latin countries, overvalued currencies caused capital flight.

3. External Shocks

The group can be categorized as external shocks to the economy. Barr and Pesaran (1997), Calvo, Leiderman and Reinhart (1993), Dooley, Fernandez-Arias and Kletzer (1996) and Frankel (1994) suggest that changes in international interest rates have been a key factor influencing capital flows to developing countries in the 1990s. Since higher interest rate affect not only the cost of new borrowing but also the interest charges on existing debt which is contracted at variable rate, we use the three-month U.S. Treasury bill rate to capture the effects of external financial developments.

As an external environmental variable, the real oil price is included in the analysis. As happened in the late 1970s and early 1980s, the supply shock of oil price increases caused a world recession and increased demand for capital in oil importing countries. Hamilton(1983) observes that all but one postwar U.S. recession were preceded by oil price increases and finds a strong negative correlation between oil price changes and GNP growth using a multivariate vector-autoregression system. Gisser and Goodwin (1986) and Dotsey and Reid (1992) largely confirm Hamilton's findings. The higher is the real oil price the higher will be the yield spread since it will cause a world recession and adversely affect oil importing countries.

4. Dummy Variables

To account for the regional differences in spreads, regional dummy variables are included in the model. ThemMexican crisis in 1994 might have driven the spread to a higher level afterwards. To investigate the effect of the Mexican Peso crisis on the spread, a period dummy (Y5) is used to distinguish transactions before 1995 from thereafter. To capture the different effect of issuer types, we categorize issuer types into public issuer and private issuer. A private issuer dummy (IS3) is included. In sum, the yield spread of fixed-income securities, SPREAD, is a function of 18 independent variables.

III. Estimation

Using pooled data, we estimated the original model with various specifications and tested the joint hypotheses of zero coefficients on the sets of variables. Since we could not

reject the null hypotheses of zero restrictions on the different sets of coefficients, we reestimated the model without these variables.

1. Data and Summary Statistics

The sources and definitions of the data used in this study are reported in the Data Appendix. Table 1 shows the summary statistics of the economic variables that are related with dollar denominated bond issues of emerging economies from 1991 to 1995. To identify the regional difference between Latin America and Asia[3], statistics for both regions are reported. First of all, one can see that the mean value of the yield spread for Latin countries is higher than Asia by 54 basis points and their standard errors are twice as large as the difference[4]. The debt-service ratio, which measures a possible liquidity problem for a country, of Latin countries are 60% higher than that of Asia. The most distinguishing features is the average inflation rate, measured by CPI. The inflation rate of Latin area is about 40 times greater than Asia. The average GDP growth rate of Asian countries is double the rate of Latin countries and the export growth rate is 60% higher in Asia. But average maturity, terms of trade and import growth rate are not much different between the two groups.

Table 2 shows the total bond issues in international bond market by issuer type. We can see that the shares of private issuers, private banking/finance and private corporate display higher growth rates.

2. Estimation and Test of Zero Restrictions on the Model

For pooled data, numerous estimation techniques has been developed (Baltige and Griffin, 1997). Because of the short panel in our dataset (11 countries with 19 regressors), we use a dummy variable model (Judge et al, 1985: Taylor, 1980). The model is estimated by OLS and White's heteroscedasticity-consistent standard errors are reported in the parentheses of Table 3.

Some of the estimated coefficients are insignificant; specifically, regional (Latin) and period (Y5) dummy variables, GDP growth rate (GDPG), real oil price (ROP), current account-to-GDP ratio (CGDP) and T-bill rate (TBILL).

To examine the robustness of the estimation results, we estimated with different specifications of the model. The results are reported in the second and third columns of Table 3.

First, we tested the joint hypothesis of zero restrictions on the coefficients of the current account-to-GDP ratio (CGDP) and real oil price (ROP). Using an F test, for the zero restrictions on the coefficients of two variables, we get F(2,431) = 1,7926. Since the significance probability of this value is 0.167, we can not reject the joint-hypothesis that the estimated coefficients of two variables are not significantly different from zero. Excluding these two variables, the model is reestimated and the result is reported in the second column of Table 3. From the first and second columns of Table 3, we can see that all the estimated coefficients change within one standard error.

Second, we tested the joint hypothesis of zero restrictions on the coefficients of period dummy (Y5), growth rate of GDP (GDPG) and net foreign asset (NFA). Using an F test, for the zero restrictions on the coefficients of three variables, we get F(3,431) = 2.199. Since the significance probability of the value is 0.087, we can not reject the joint-hypothesis that the estimated coefficients of three variables are not significantly different from zero at the 5 per cent critical level. Excluding these variables, the model is reestimated and the results are reported in the third column of Table 3. We can see that all the estimated coefficients change within one standard error.

Since two different specifications of the original model, which have statistical support based upon an F test, provide robust estimates, in the sense that all the estimated coefficients change within one standard error, we can conclude that the estimation results are robust.

3. Estimation Results and Inference

(1) Dummy Variables

From Table 3, we can see that the estimated coefficient of the issuer type dummy variable has an expected positive sign, implying that private sector issuers pay a higher yield spread than public sector issuers.[5] The private sector includes private corporate and private utilities. Insignificance of the estimated coefficient of the regional dummy variable (LATIN) can be attributable to the lower spread levels of Columbia, Mexico and Venezuela, whose transactions dominated in frequencies and amounts during the 1990s.

Considering the impact of the Mexican Peso crisis in 1994, it might have caused a structural shift of the yield spread to a higher level. According to the JPMorgan emerging local market index, average yield spread of Mexico rose after early 1994, reaching a peak in the March of 1995 due to unfavorable market sentiment (IMF, 1996), and then trended downwards till early 1997, now equaling the level that prevailed in early 1994. However, as we can see in Table 3 , we can not find any significant difference in the spread levels before and after the 1994 Mexican crisis. This finding is consistent with Antzoulatos (1996), who finds that global bond issuance is not affected by the Mexican peso crisis. This can be explained by two factors. First of all, from the end of 1994, the world's major bond markets witnessed one of the greatest rallies supported by an environment of declining interest rates which reflected optimism about the prospects of US budget deficit reduction. Second, the high levels of volatility in bond markets that had emerged with the onset of the turbulence in early 1994, and which were sustained by developments during the crisis in emerging markets in early 1995, started to decline to a more normal level during the summer and fall of 1995 (IMF: 1995, 1996).

(2) Liquidity and Solvency Variables

All the estimated coefficients of the liquidity variables are significant and have expected signs. First of all, the total debt-to-GDP ratio (DGDP) is significant and has the expected sign. A 1 percent increase in debt-to-GDP ratio (DGDP) increases the yield spread by 1.005 percent. Second, the nongold international reserves-to-GDP ratio (RGDP) has a significant and expected negative sign. The growth rate of exports (imports) is negatively (positively) related to the yield spread of fixed-income securities, with the estimated

coefficient being significant at the 1 percent critical level, implying that the increased export income lessens the liquidity constraint on the economy. The estimated coefficient of the debt-service ratio (DSX) is significant and has an expected positive sign. This confirms that the yield spread of developing countries increases with a higher debt-service ratio, which is a measure of the liquidity problem of a country. A one percent increase in the debt-service ratio will increase the yield spread by 1.03 percent. Finally, net foreign assets, as measured by the cumulative current account (NFA), are significant and have the expected negative sign. A one percent increase in net foreign assets lowers the spread by 1.022 percent.

(3) Macroeconomic Fundamentals

Three most important macroeconomic fundamentals determining the yield spread are the domestic inflation rate (INF), the terms of trade (TOT) and the real exchange rate (RXI). First, high inflation (INF) in a country implies an unhealthy macroeconomic situation and causes an increase in the yield spread. The estimated coefficient is significant and has the expected positive sign. Based on the estimated coefficient, a one percent increase in the domestic inflation rate is associated with 1.016 percent increase in the yield spread.

An mprovement in the terms of trade (TOT) implies an increase in export earnings, better repayment capacity, and these reduces the yield spread. The estimated coefficient is significant and has an expected negative sign, with a one percent improvement in the terms of trade reducing the yield spread by 1.02 percent.

For the real exchange rate (RXI), the CPI adjusted real exchange rate index is used and the estimated coefficient is significant and has the expected positive sign. This finding implies that certain countries have maintained a real exchange rate at a too competitive level which caused high inflation and contraction in the economy, which increased the yield spread [see (Kamin and Rogers, 1997) for discussion].

(4) External Shocks

The insignificance of world interest rates as proxied by U.S. T-bill rate is not surprising, since bond issue, differently from syndicated loans, does not tie interest payments to a short-run dollar rate, and, the share of private debt that is tied to the short-run T-bill rate is less than 15 percent of total bond issues. This is consistent with Antzoulatos (1996), who finds that the U.S. interest rates were not a determinant of bond flows to the Latin countries in the 1990s.

The estimated coefficient of the real oil price (ROP) variable is insignificant in explaining the determination of the yield spread of the fixed-income securities in the 1990s. In other words, the force of global bond issuance is overwhelming external shocks and these variables turned out to be insignificant in our estimation.

(5) Maturity

The estimated coefficient of maturity is significant and negative, implying a negative yield curve. An inverted yield curve occurs when a surge in demand for short-term credit drives up short-term rates on instruments like Treasury bills and money-market funds, while long-term rates move up more slowly, since borrowers are not willing to commit themselves to paying high interest rates for many years in the future. This happened in the late 1970s and early 1980s (Edwards,1985), when short-term interest rates were around 20%, while long-term rates rose to almost 16 to 17%. Also, in the 1990s, there has been a surge in short-term borrowing by Korea, Mexico and Thailand, whose transactions dominated in terms of frequency and amount, and remained at higher levels during the period. From Table 7, we can find that ratios of short-term debt to total debt for those three countries are much higher than that of the developing countries as a whole. This increased demand for short-term capital brought about a negative yield curve in the international bond market in the 1990s. If we look at the time trend of the mean values of the maturity and spread, the average yield spread is decreasing while the average maturity is increasing since 1992[6]. This reflects the increased supply of funds[7] into the emerging economies and this has decreased time-varying liquidity premium (Mankiw and Summers, 1984) which caused overborrowing of some emerging economies whose rate of return on investment was quite low.

From the estimated equations of (2) to (4) in Table 5, we can see that Latin countries, in sum, have significant and negative yield spread relationships. Table 6 shows the spread-

maturity regression of the individual Latin countries, with Argentina, Brazil, and Mexico having a significant negative yield curve. From Table 5 in equation (5) to (7), public issuers of Asian countries face a significant negative yield curve. However, the explanatory power of the regression is too low to make any meaningful inference for Asian countries. As we can see in Table 6, a negative yield curve of Latin countries dominate and, as a result, emerging economies, in sum, had a negative yield curve in the 1990s.

4. Volatility Analysis

We investigated whether the volatility of bond spreads is systematically affected by certain factors and found that both liquidity and macroeconomic fundamentals are shown to affect spread volatility. If we look at the correlation matrix in Table 4, correlation coefficients of levels (in the upper section) and standard deviations (in the lower section) of spread with other variables are reported. Except for net foreign assets (NFA) and the growth rate of GDP (GDPG), all the estimated correlation coefficients, measured by standard deviastions, are significant.

From the lower section of table 4, the volatility of spread is highly correlated with the debt-to-GDP ratio (DGDP), international reserves-to-GDP ratio (RGDP) and domestic inflation rate (INF). This implies that not only the level of the bond spread but also the volatility of the spread is significantly and positively affected by these three economic fundamentals.

IV. Concluding Remarks

With the dramatic surge in international bond issues in the 1990s and ongoing turbulance in emerging economies, this paper has investigated the determinnats of bond spreads for emerging markets.

This study identifies several groups of important explanatory variables for the cross-country differences in bond spreads. First of all, liquidity and solvency variables are found to be significant for the yield spread determination. Specifically, these are debt-to-GDP ratio, the international reserves-to-GDP ratio, the debt service ratio and export and import growth rates. Second, some of the macroeconomic fundamentals are found to be significant for the bond spread determination. These include the domestic inflation rate, net foreign assets as measured by the cumulative current account, the terms of trade and real exchange rate.

However, external shocks as measured by the real oil price and the international interest rate were found to be insignificant for the bond spreads determination. This implies that variation in benchmark rates themselves matter little. Finally, it is reported that Latin countries have an inverted yield curve and that volatility of bond spreads is highly correlated with the domestic inflation rate, debt-to-GDP ratio and international reserves-to-GDP ratios.

The lessons for developing economies seeking greater access to the international bond market with lower spread seems clear: (i) sound management of macroeconomic fundamentals, especially containing the domestic inflation rate, and (ii) keeping her liquidity, especially the international reserves-to-GDP ratio, at a relatively higher level.

There is a potential extension to this paper. Useful extension of this paper would be to conduct out-of-sample forecasting exercise to determine whether the international bond pricing model proposed here can accurately forecast yield spread for emerging economies.

Data Appendix

Dependent Variables

SPREAD: Yield spread data are from Euromoney Bondware and this is defined as the number of basis points which a fixed rate issue yields above or below a comparable (in duration) government bond at its launch price.

Dummy Variables

IS3 : Issuer type dummy; 1 if private issuer, 0 otherwise.

LATIN : Regional dummy; 1 if Latin countries, 0 otherwise.

Y5 : Issue period dummy; 1 if issues in 1995, 0 otherwise.

Liquidity and Solvency Variable

DGDP : Ratio of total external debt (World Debt Table) to GDP (IMF's IFS line 99.b converted to U.S. dollars by the exchange rate in IFS line ae/we.

RGDP : Ratio of international reserves (IFS line 11.d) to GDP.

CGDP : Ratio of current account (IFS line 77.ad) to GDP.

DSX : Debt service (World Debt Table) to export (IFS line 70 converted to U.S. dollars by the exchange rate in IFS line ae/we).

IMG : Growth rate of import (IFS line 71).

GDPG : Growth rate of GDP (IFS line 99.b).

EXG : Growth rate of export (IFS line 70).

NFA : Net foreign asset measured by cumulated current account deficit/surplus with a benchmark figure of 1989.

Macroeconomi Fundamnetals

TOT : Terms of trade calculated by dividing export price (IFS line 76) by import price (IFS line 76.x) . For those countries whose value is missing in IFS, we

get the export price by dividing current export (import) of goods and non-factor services by 1987 constant price export (import) of goods and non-factor services in the World Bank data base.

INF : Annual inflation rate measured by CPI (IFS line 64).

RXI : Nominal exchange rate (IFS line ae/we) adjusted by CPI (IFS line 64).

External Shocks

ROP : Real oil price, average crude oil price (IFS line 001) deflated by G-7 inflation rate (the World Bank database).

TBILL : Three month U.S. treasury bill rate (IFS line 60.c).

Debt Related Variables

MT : Maturity of a bond (Euromoney Bondware).

AMT : Amount of a bond (Euromoney Bondware).

Others

Emerging Local Market Index for Mexico was obtained from the JPMorgan Inc.

Web address: http://www.jpmorgan.com

Endnotes

1. But most of previous studies [Sachs, 1981: Burton and Inoue, 1985] got insignificant coefficients for this variable in their analyses of bank's risk premia.

2. From nation income identity, current account balance is the sum of fiscal balance and private saving investment gap. Fiscal variable, fiscal balance, is not included in the study to avoid multicollinearity.

3. Latin countries included in analysis are Argentina, Brazil, Chile, Columbia, Mexico and Venezuela. Asian countries include China, Indonesia, Malysia, Korea, Philippines.

4. Chile, Columbia, Mexico and Venezuela have relatively lower spread than other Latin countries and this contributed to the lower mean value of the Latin yield spread.

5. Public issuers include central government, local authority, public bank, public corporate, public finance, public utility, state/provincial authority and supernational institutions. Private issuers include private bank, private corporate, private finance and private utility.

6. Average yield spread and maturity for the dollar denominated bond issue of 1991-1996 are given below:

	1991	1992	1993	1994	1995	1996
Spread	351.2	409.1	379.2	355.0	334.4	298.9
Maturity	4.61	4.19	5.36	5.51	6.45	8.39

Source: Euromoney Bondware

7. All major recipient of capital flows saw a dramatic surge in private capital inflows during the 1990s and this surge have been extremely large in relation to the size of the economies (The World Bank, 1997). Annual average capital flows to developing countries are given below.

Annual average capital inflows (billions of U.S. dollars)

	1983-89	1990-94
All developing countries		
Total net capital inflows	8.8	104.9
Net FDI	13.3	39.1
Net portfolio investment	6.5	43.6
Other	- 11.0	22.2

Source; International Capital Markets: Developments, Prospects and Policy Issues, IMF, 1995.

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Table 1. Summary Statistics of the Data

Varaiable	Mean	Standard Error	Skewness	Kurtosis
Spread				
Latin	378.597	164.900	-0.0021	-0.3605
Asia	324.844	115.439	0.5712	-0.5661
Maturity				
Latin	5.303	3.941	3.0686	14.5431
Asia	5.763	3.128	1.4391	4.1946
Inflation				
Latin	416.389	784.852	1.6321	0.8562
Asia	12.364	18.089	3.1228	9.0218
Debt-Service Ratio				
Latin	49.179	116.260	11.4890	154.54
Asia	34.900	37.660	2.9026	14.424
Terms of Trade				
Latin	102.690	11.630	- 0.2661	-1.768
Asia	103.050	6.830	0.2511	-0.108
GDP Growth rate				
Latin	3.545	3.159	-0.1116	-0.348
Asia	6.387	3.579	3.1539	15.947
Import Growth rate				
Latin	4.609	0.920	-2.2016	81.55
Asia	4.590	1.410	-1.6217	34.792
Export Growth rate				
Latin	11.320	8.560	0.4344	2.6606
Asia	15.620	11.760	-0.4766	0.5213

Number of observations for Latin Countries: 416
Number of observations for Asian Coubtries: 66

Table 2. Bond Issues in International Capital Market by Issuer Types

Unit:U.S. Million dollars

Issuer Type	1990	1991	1992	1993	1994	1995
Public						
Central Government	200.0	190.2	300.0	906.8	2099.3	569.2
Local Authority	0	0	0	46.1	300.0	0.0
Public Banking/Finance	1136.6	1438.6	2967.4	4716.8	5766.7	6465.8
Public Corporate	167.1	100.0	25.0	1071.4	150.0	1338.3
Public Utility	0	0	300.0	2322.1	862.1	1301.7
Private						
Private Banking/Finance	100.0	322.4	502.1	1295.0	4441.7	6299.5
Private Corporate	430.0	1326.8	1421.6	3410.3	4774.2	5152.3
Private Utility	0	0	0	0	1254.0	600.0
Total	2033.7	3377.9	5516.1	13768.4	19648.0	21726.7

Source: Euromoney Bondware

Table 3: Pooled Estimation of the Model

	(1)	(2)	(3)
1. Constant	6.009**	6.421**	5.676**
	(0.514)	(0.400)	(0.470)
2. IS3	0.276**	0.279**	0.296**
	(0.045)	(0.046)	(0.044)
3. LATIN	0.062	0.086	0.103
	(0.068)	(0.068)	(0.081)
4. Y5	-0.067	-0.077	—
	(0.045)	(0.044)	
5. DGDP	0.005**	0.007**	0.005**
	(0.001)	(0.002)	(0.001)
6. RGDP	-0.026**	-0.003**	-0.024**
	(0.005)	(0.007)	(0.005)
7. CGDP	0.021	—	0.015
	(0.023)		(0.023)
8. DSX	0.030**	0.029**	0.030**
	(0.003)	(0.003)	(0.003)
9. IMG	0.039 **	0.039**	0.030**
	(0.012)	(0.012)	(0.012)
10. EXG	-0.011**	-0.011**	-0.009**
	(0.003)	(0.003)	(0.003)
11. GDPG	0.017	0.009	—
	(0.011)	(0.010)	
12. NFA	-0.022 *	-0.017*	—
	(0.008)	(0.009)	
13. INF	0.016 **	0.015**	0.017**
	(0.003)	(0.003)	(0.003)
14. TOT	-0.019**	-0.019**	-0.015**
	(0.004)	(0.004)	(0.004)
15. RXI	0.164 *	0.120*	0.145*
	(0.065)	(0.055)	(0.068)
16. ROP	0.005	——	0.003
	(0.005)		(0.005)
17. TBILL	0.039	0.029	0.049
	(0.026)	(0.027)	(0.027)
18. MT	-0.015 **	-0.016**	-0.014**
	(0.004)	(0.004)	(0.004)
19. AMT	-0.032 **	-0.033**	-0.031**
	(0.009)	(0.009)	(0.009)
	Adj. R^2 = 0.649 ,	Adj. R^2 =0.647,	Adj. R^2 =0.646,
Number of observations = 505			

Notes:

1. *OLS* is used for the estimation and figures in the parentheses are White's heteroscedasticity consistent standard errors.
2. Double asterisks(**) denote the significance of the estimated coefficient at 1% critical level and single asterisk(*) denotes that estimated coefficients are significant at 5% level.

Table 4: Correlation Matrix

	SPD	DGDP	RGDP	ROP	INF	NFA	TOT	DSX	RXI	MT	AMT	GDPG
SPD	1.000											
DGDP	.561	1.000										
RGDP	.529	.142	1.000									
ROP	.192	.386	-.036	1.000								
INF	.520	.213	.737	.132	1.000							
NFA	.154	.114	.421	.106	.338	1.000						
TOT	.387	-.291	-.764	-.096	-.637	-.657	1.000					
DSX	.324	-.188	-.087	.034	-.179	-.419	.348	1.000				
RXI	.020	-.277	-.085	-.500	-.100	-.097	.159	.247	1.000			
MT	-.460	-.129	-.290	-.215	-.244	-.123	.215	-.209	.042	1.000		
AMT	-.392	-.066	-.263	-.085	-.206	-.079	.162	-.211	-.005	.374	1.000	
GDPG	-.141	-.336	-.051	-.236	-.108	.433	.138	-.193	-.007	.123	.103	1.00

Standard Deviation (time-varying)

	SPD	DGDP	RGDP	ROP	INF	NFA	TOT	DSX	RXI	MT	AMT	GDPG
SPD	1.000											
DGDP	.638	1.000										
RGDP	.537	.944	1.000									
ROP	-.183	-.574	-.523	1.000								
INF	.613	.765	.512	-.453	1.000							
NFA	.025	.001	-.062	-.447	.107	1.000						
TOT	.475	.751	.804	-.418	.392	.254	1.000					
DSX	.119	.243	.385	-.088	-.123	.421	.667	1.000				
RXI	-.174	-.267	-.076	.451	-.534	-.033	.006	.454	1.000			
MT	-.288	-.276	-.107	.308	-.514	-.003	.219	.570	.299	1.000		
AMT	-.148	-.036	.164	-.103	-.426	-.037	.305	.349	-.008	.665	1.000	
GDPG	.005	-.095	-.071	.486	-.093	- .199	.230	.280	.276	.602	.097	1.000

Notes:
1) Standard deviation is calulated using 24 observations each time.
2) Underlined figures are *in*significant at 5 percent critical level.

Tabel 5. Spread Maturity Regressions for Country Group

All countries

1) Spread =394.07** -0.525 **(MT)^2, Adj. R^2= 0.92
(7.86) (0.106)

Latin countries

2) Latin Countries: All, Number of observations= 417

Spread =418.92** -0.51 **(MT)^2, Adj. R^2= 0.06
(8.12) (0.15)

3) Latin Countries: Private Issuers, Number of observations= 309

Spread = 470.14** - 1.34* (MT)^2, Adj. R^2= 0.096
(13.56) (0.54)

4) Latin Countries: Public Issuers, Number of Observations= 107

Spread =312.16** - 0.17**(MT)^2, Adj. R^2= 0.026
(13.19) (0.054)

Asian countries

5) Asian Countries: All, Number of observations= 66

Spread =256.72** - 0.18 **(MT)^2, Adj. R^2= 0.01
(20.05) (0.06)

6) Asian Countries: Private Issuers, Number of observations= 25

Spread = 256.17** + 0.65(MT)^2, Adj. R^2= 0.01
(33.27) (0.44)

7) Asian Countries: Public Issuers, Number of Observations= 41

Spread =174.78** -0.10*(MT)^2, Adj. R^2= 0.01
(19.10) (0.04)

Notes:
1. Double asterisks denote the significance of estimated coefficient at 1% critical level and single asterisk 5% level.
2. White's heteroscedasticity consistent covariance matrix estimation is used for the standard errors.

Tabel 6. Spread Maturity Regressions for Individual Latin Countries

Argentina

1) Argentina: Number of observations = 83
Spread =462.4** -21.88** $(MT)^2$, Adj. R^2= 0.148
(14.60) (0.51)

Brazil

2) Brazil: Number of observations = 158
Spread =519.77** -1.48** $(MT)^2$, Adj. R^2= 0.062
(13.18) (0.51)

Columbia

3) Columbia: Number of observations = 21
Spread =193.71** - 0.08 $(MT)^2$, Adj. R^2= 0.045
(25.46) (0.37)

Mexico

4)Mexico: Number of observations = 121
Spread =322.69** -0.22** $(MT)^2$, Adj. R^2= 0.083
(10.97) (0.04)

Venezuela

5) Venezuela: public issuers, Number of observations = 23
Spread =277.26** +0. 10 $(MT)^2$, Adj. R^2= 0.034
(21.66) (0.21)

Notes:
1. Double asterisks denote the significance of estimated coefficient at 1% critical level and single asterisk 5% level.
2. White's heteroscedasticity consistent covariance matrix estimation is used for the standard errors.

Table 7. The Ratio of Short-term Debt to Total Debt for Selected Emerging Economies

Unit: Percent

Country	1991	1992	1993	1994	1995
All Developing Countries	17.9	19.2	18.8	17.9	18.3
	(280)	(313)	(335)	(345)	(378)
Brazil	21.8	18.7	21.3	20.7	19.2
	(26.3)	(24.1)	(30.6)	(31.4)	(30.5)
Mexico	19.2	21.9	27.6	28.1	22.5
	(21.9)	(24.5)	(36.3)	(39.3)	(37.3)
Korea*	43.9	43.2	43.7	53.4	57.7
	(17.2)	(18.5)	(19.2)	(30.4)	(45.3)
Thailand	33.1	35.2	31.3	29.2	32.3
	(12.5)	(14.7)	(13.4)	(14.0)	(18.3)

Notes:
1. Figures in the parentheses are short-term debt in billion US dollars
2. Sources: The World Bank, Global Development Finance, 1997
   * Bank of Korea, Main Economic Indicators, 1997.

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